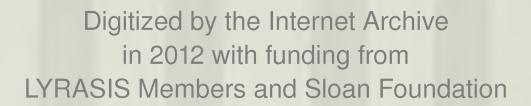
# UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

GROUND-WATER DATA FOR 1976-77 IN

JOSHUA TREE NATIONAL MONUMENT, CALIFORNIA

Open-File Report 78-854

Prepared in cooperation with the
National Park Service



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# CONTENTS

	Page
Conversion factors	IV
Abstract	1
Introduction	2
Well-numbering system	3
Water quality	4
Pumpage and water levels	5
References cited	6

# ILLUSTRATIONS

		F	Page
Figure	1.	Map of Joshua Tree National Monument, showing location of	
		observation wells	7
:	2.	Map of the Oasis of Mara, Joshua Tree National Monument,	
		showing location of observation wells	8
		TABLES	
		F	age
Table 1		Chemical analyses of ground water	9
2		Pumpage from wells in Pinto Basin by Kaiser Steel Corp.	
		for calendar years 1976-77	10
3	•	Yearly pumpage from wells in Pinto Basin by	
		Kaiser Steel Corp. for calendar years 1960-77	11
4		Ground-water levels in observation wells	12



### CONVERSION FACTORS

For readers who prefer metric units rather than U.S. customary units, the conversion factors for the terms used herein are listed below:

Multiply U.S. customary un	nit By	To obtain metric unit
acres	4.047 x 10 <sup>-1</sup>	hectares
acre-ft (acre-feet)	1.233 x 10 <sup>-3</sup>	cubic hectometers
ft (feet)	$3.048 \times 10^{-1}$	meters
gal (gallons)	3.785	liters
in (inches)	2.540	centimeters
mi (miles)	1.609	kilometers



GROUND-WATER DATA FOR 1976-77 IN JOSHUA TREE NATIONAL MONUMENT,

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By J. D. Downing

### ABSTRACT

A continuing study of ground water in Joshua Tree National Monument shows that during 1976-77 water levels fluctuated seasonally; slight declines were detected in the Oasis of Mara and the Pinto Basin. Water quality was generally good, with a high concentration of fluoride in one well in the southern part of the Monument.



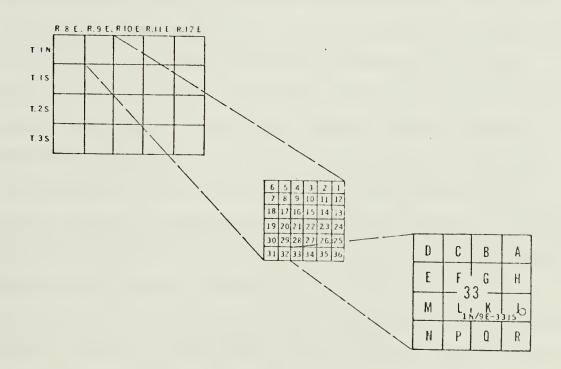
### INTRODUCTION

This report, prepared at the request of the National Park Service, is part of a continuing inventory by the U.S. Geological Survey of general geohydrologic conditions at Joshua Tree National Monument (fig. 1). The report includes chemical analyses of ground water from two wells (table 1), pumpage by Kaiser Steel Corp. from Pinto Basin (table 2), yearly pumpage by Kaiser Steel Corp. (table 3), and water-level measurements in observation wells in the monument (table 4). Data on pumpage and on water levels before the period of this report were published in Geological Survey Water-Supply Paper 1475-0 (Kunkel, 1963) and in previous annual reports to the National Park Service.



### WELL-NUMBERING SYSTEM

The well-numbering system used by the Geological Survey in California indicates the location of wells according to the rectangular system for the subdivision of public land. For example, in the well number 1N/9E-33J5 that part of the number preceding the slash indicates the township (T. 1 N.); the number following the slash indicates the range (R. 9 E.); the number following the hyphen indicates the section (sec. 33); and the letter following the section number indicates the 40-acre subdivision of the section according to the lettered diagram below. The final number is a serial number for wells in each 40-acre subdivision.





### WATER QUALITY

Water samples were collected for chemical analysis during November 1976 and October 1977 from well 2S/8E-21Gl (NPS Lost Horse No. 1), which is currently unused, and well 4S/11E-27Ql (NPS Cottonwood well), which provides water for public supply in the Cottonwood Spring area. The water samples were analyzed in 1976 by the Geological Survey laboratory in Denver, Colo., and in 1977 by the California Department of Water Resources laboratory in Bryte, Calif. These analyses are in table 1.

In general, the water from these two wells is a calcium sodium bicarbonate type; the concentration of dissolved solids is less than 300 mg/L (milligrams per liter). The chemical quality of the water from these wells is good except for the fluoride concentration in well 4S/11E-27Q1. In 1977 this concentration was 3.1 mg/L, which exceeds the recommended limit for drinking water (National Academy of Sciences, National Academy of Engineers, 1972, p. 66) by 1.7 mg/L. This high concentration of fluoride was also noted by Weir and Bader (1963, p. 45). Excessive fluoride in drinking water when used over a considerable span of time produces objectionable dental fluorosis (mottled teeth) in children that increases in severity with increases of fluoride concentration. According to McKee and Wolf (1963, table 6-5), concentrations of 2.0 to 3.0 mg/L produce moderate to severe mottling of teeth in children.



### PUMPAGE AND WATER LEVELS

The pumpage by Kaiser Steel Corp. from Pinto Basin near observation well 3S/15E-4J1 was 2,700 acre-ft in calendar year 1976 and 3,000 acre-ft in calendar year 1977 (table 2). Since 1960, 49,300 acre-ft has been pumped for a yearly average of about 2,700 acre-ft (table 3).

Observation wells throughout Joshua Tree National Monument were measured semiannually to detect water-level changes. These water-level measurements are in table 4. In the Oasis of Mara (fig. 2), water-level measurements show seasonal fluctuations for the last 2 years. The general trend, however, is a slight decline in water level on both sides of the Pinto Mountain fault. In other areas of the monument (fig. 1), during the past 2 years water levels have risen in two wells, stayed about the same in two wells, and fallen in three wells. All these changes are small. The largest change is a decline of about 3 ft in well 1S/7E-27Rl (Willets Well). The water level in this well has shown a steady decline since 1966 and has fallen about 45 ft in 12 years.

This water-level drop probably is caused by Barker Dam (fig. 1), approximately 6 mi upstream, which holds back surface-water runoff that eventually replenishes ground-water supplies in the Quail Wash area.



### REFERENCES CITED

- Kunkel, Fred, 1963, Hydrologic and geologic reconnaissance of Pinto
   Basin, Joshua Tree National Monument, Riverside County, California:
   U.S. Geological Survey Water-Supply Paper 1475-0, p. 537-561.
- McKee, J. E., and Wolf, H. W., 1963, Water quality criteria: California State Water Resources Control Board, 548 p.
- National Academy of Sciences, National Academy of Engineering, 1972
  [1974], Water quality criteria 1972: U.S. Government Printing
  Office, 594 p.
- Weir, J. E., Jr., and Bader, J. S., 1963, Ground water and related geology of Joshua Tree National Monument, California: U.S. Geological Survey open-file report, 123 p.



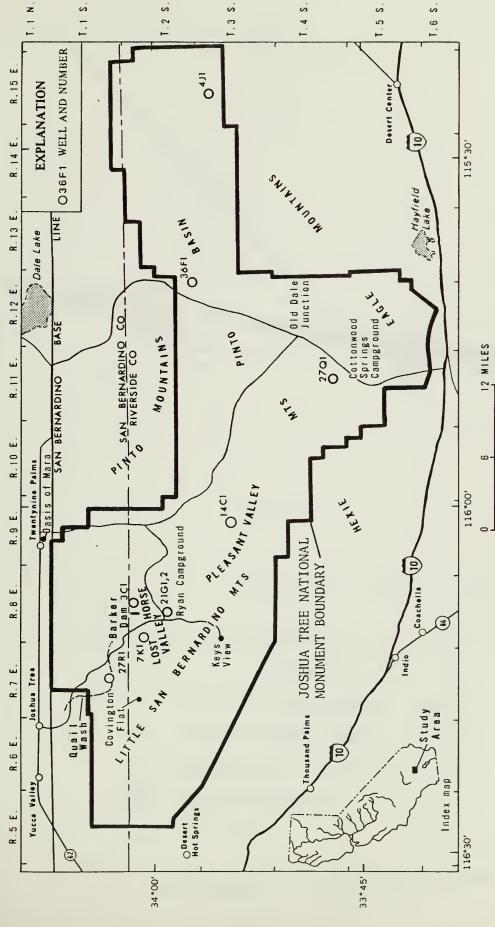
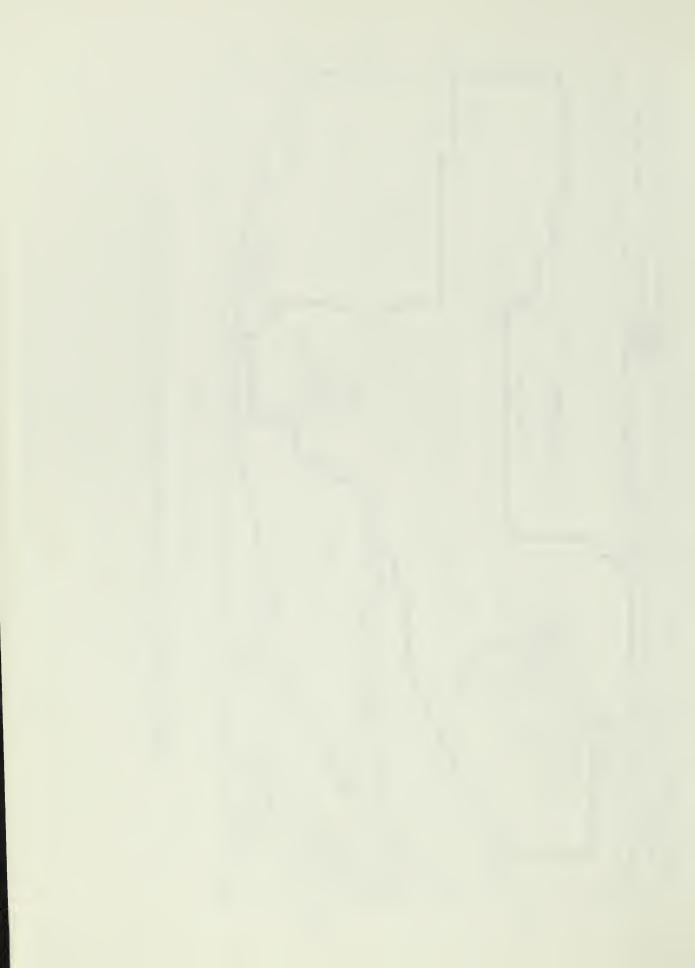
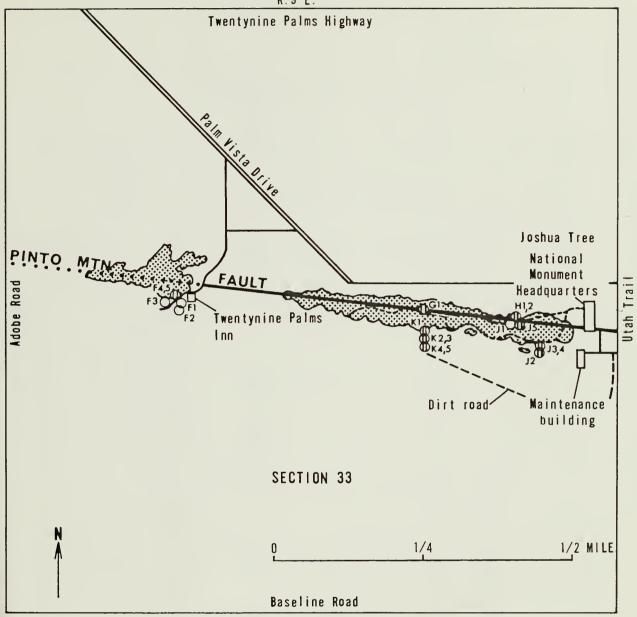


FIGURE 1.--Joshua Tree National Monument showing location of observation wells.







### **EXPLANATION**

TEST WELL AND NUMBER—Augered in 1973-74

OJI WELL AND NUMBER—Existing prior to 1973

AREA OF PHREATOPHYTES

NATURE TRAIL

FIGURE 2.--The Dasis of Mara, Joshua Tree National Monument, showing location of observation wells.



TABLE 1. -- Chemical analyses of ground water

[Constituents in milligrams per liter except iron and boron in micrograms per liter]

(II) uosog	130	160	110	100	150	120	130	100	
Mater Lemperature (Deserged)	19.5	18.5	19.5	18.0	26.5	21.0	21.5	24.0	
Hq	7.8	;	;	7.5	8.0	:	:	7.8	
officeq2 soncloubnos (sodmossim)	430	077	420	470	577	400	415	087	
Sodium adsorption ratio (SAR)	1.3	1.2	1.2	1.3	1.6	1.6	1.6	1.8	
Percent muibos	35	32	34	34	41	42	43	77	
llardness (Ca, Mg)	150	150	140	140	130	110	110	120	
bevlossid sbilos lo mus) (sineulitanos	269	261	256	254	268	235	245	261	
Sirrate (80%)	0.18	.21	07.	1.8	1.4	1.4	.08	9.1	
Fluoride (F)	0.8	∞.	∞.	6.	2.6	2.3	2.7	3.1	
Chloride (C1)	23	24	24	21	39	39	39	41	
Sulfate (408)	29	29	32	33	25	24	26	27	
Carbonate (CO <sub>3</sub> )	0	0	0	0	0	0	0	0	
Bicarbonate (HCO <sub>3</sub> )	190	190	180	180	140	140	140	140	
Potassium (K)	1.1	1.1	1.2	1.2	2.0	1.5	1.6	1.7	
muibo2 (EV)	37	32	33	35	42	38	39	45	
muisəngeM (SK)	11	8.6	9.3	10	8.3	7.0	6.5	7.5	
muists) (E3)	42	27	40	41	38	33	34	37	
no1[ (91)	50	07	20	:	07	50	0.7	:	
Silica (SUS)	31	26	56	23	č	21	25	30	
Date of sample	10-18-742	11-13-752	11-05-763	10-06-774	10-11-01	1 11-12-752	11-04-763	10-05-774	
Well number	1917-18/85	NIS LOST	100		18/11E-2701	Cottonwood 11-12-75	c (Tien		

JSamples obtained with a thief sampler.

Janalyses by U.S. Geological Survey laboratory, Salt Lake Ciry, Utah.

Analyses by U.S. Geological Survey laboratory, Denver, Colo.

Analyses by California Department of Warer Resources laboratory, Bryte, Calif.

Samples obtained when well was being pumped.



TABLE 2.--Pumpage from wells in Pinto Basin by Kaiser Steel Corp.

for calendar years 1976-77

[Metered in thousands of gallons, data furnished by Kaiser Steel Corp. (to convert from thousands of gallons to acre-feet divide by 325.8)]

	1976	1977	Total
January	53,733	44,595	98,328
February	59,769	62,363	122,132
March	76,473	69,360	145,833
April	79,615	75,411	155,026
May	83,432	78,953	162,385
June	89,130	93,221	182,351
July	89,560	92,014	181,574
August	81,472	171,922	253,394
September	63,664	71,904	135,568
October	76,932	78,742	155,674
November	65,964	75,853	141,817
December	73,523	59,873	133,396
Total <sup>1</sup> (thousands of gallons)	893,000	974,000	1,870,000
Total <sup>2</sup> (acre-feet)	2,700	3,000	5,700

<sup>&</sup>lt;sup>1</sup>Rounded to three significant figures.

<sup>&</sup>lt;sup>2</sup>Rounded to two significant figures.



TABLE 3.--Yearly pumpage from wells in Pinto Basin by Kaiser Steel Corp. for calendar years 1960-771

[Metered in thousands of gallons, data furnished by Kaiser Steel Corp. (to convert from thousands of gallons to acre-feet divide by 325.8)]

Year	Thousands of gallons <sup>2</sup>	Acre-feet <sup>3</sup>
1960	569,000	1,700
1961	630,000	1,900
1962	749,000	2,300
1963	1,190,000	3,600
1964	1,140,000	3,500
1965	969,000	3,000
1966	1,020,000	3,100
1967	1,090,000	3,300
1968	891,000	2,700
1969	949,000	2,900
1970	967,000	3,000
1971	846,000	2,600
1972	792,000	2,400
1973	833,000	2,600
1974	827,000	2,500
1975	819,000	2,500
1976	893,000	2,700
1977	974,000	3,000
Total	16,100,000	49,000

<sup>&</sup>lt;sup>1</sup>For pumpage prior to 1960, see Kunkel, 1963, p. 558.

<sup>&</sup>lt;sup>2</sup>Rounded to three significant figures.

<sup>&</sup>lt;sup>3</sup>Rounded to two significant figures.



# TABLE 4.--Ground-water levels in observation wells

[Depth of well given in whole feet was reported by owner, driller, or other; depth given in tenths of a foot was measured below land-surface datum by the U.S. Geological Survey. Measurements are in feet below or above (+) the described point of reference]

### Standardized footnotes

- a. Well being pumped.
- b. Well pumped recently.
- c. Nearby well being pumped.
- d. Nearby well pumped recently.
- e. Estimated.
- f. Dry.
- g. Measurement by outside agency or person.
- h. Tape measurement.
- Affected by outside influence (wind, atmospheric pressure, ocean tides, railroad trains).
- j. Water level below sea level.
- k. Measurement from recorder chart.
- m. Obstruction in well above water surface.
- n. No measurement.



# GROUND-WATER LEVELS IN OBSERVATION WELLS

CALIFORNIA	COUNTY	San Bernardino	ino	ARE	AREA OR BASIN Copper Mountain Hydro Subunit (X-8.BO)	er Mountair	Hydro Subu	nit (X-8.BO		
State number 15/ Well-code number	7E-27R1 S 340302N1161406.1	61406.1.	Depth of well	11 182.0 (55.5 m)	ft. Altıb	Altitude of land-surface datum_	sce datum 3,	3,770 feet a (1,149 m)	feet above mean sea level	-
Description of well:	National	National Park Service (Willett	ce (Willetts	Well). In	s Well). In Quail Wash south of Joshua Tree (village)	south of Jo	shua Tree (	illage)	and west of	•
	Lost H	Lost Horse Valley.	Drilled	nused well	unused well in alluvium, diametor 5 in (13 cm).	, diameter	5 in (13 cm)	•		
Records available	1958, 19	1961-	Highest water level	(25.17 m) evel 82.59		C)	(53.30 Lowest 174.86	(E)	Oct. 6 . 1977	7
			All water levels	All water levels are referenced to	o land-surface	face datum	1			
1966		19	1967	1968	8	1969	59	1970	0	
Dete	Water level	Data	Water level	Date	Water level	Date	Water level	Date	Water level	
-1	129.75	- 1	136.83		(m)		(m)	Apr. 8	160.98	
0ct. 26	134,70	Oct. 25	(m)	Oct. 29	(m)	Oct. 24	159,4	Oct. 30	162.15	
		•								
1971		1972	72	1973	3	1974	7.4	1975	5	St
Apr. 1	166.50		164.80	Mar. 17	169,80	Feb. 26	169.12	Apr. 7	170.85	ate
		Jun. 15	165.74	Sep. 25	168,40	Oct. 18	170.20	Nov. 13	171.83	nur
								, ^ ,		nber
1976		1977	77							,15
Mar, 25	172,11	Apr. 20	173.90							/7
Nov. 4	173.07	Oct. 6	174.86							E-
			!							27R
										1 S
							•			
										=



### GROUND-WATER LEVELS IN OBSERVATION WELLS

	le l	44		2						Sta	ato	num	be
80)	feet above mean sea level	well). South of the Wonderland of Rocks and about 2 mi (3 km) north of	•	Jun. 15, 1972	7.0	Water level	92.50	93.70			94,44	94.63	
bunit (X-8.	1 m)	out 2 mi (3		m)	1970	Date	Apr. 8	Oct. 29		1975	Apr. 8	Nov. 13	
Copper Mountain Hydro Subunit (X-8.BO)	Altitude of land-surface datum 4,500	locks and ab		(30.84 Lowest 101.18	69	Water level	92.01	92,28		7.4	94.08	94.30	
opper Mounts	tude of land-surf	derland of F	6 ft (2 m).	Oct. 25, 1967 urface datum	1969	Date	Apr. 22	Oct. 24		1974	Feb. 26	Oct. 18	
AREA OR BASIN CO	ft. Atti	of the Wond	, diameter	ft	8	Water level	94,60	92,17		53	98,61	94.07	
ARE	108 (53 m)	1). South	in residuum	(28.04 m) vel 91.99 are referenced to 1	1968	Date	Apr. 5	Oct. 30		1973	Mar. 17	Sep. 25	
	Depth of well		Dug unused well in residuum, diameter 6 ft (2 m).	(28.0. Highest water level 91.99. All water levels are referenced	7	Water level	92.06	91.99		2	93,38	101,18	
Riverside	60800.1	National Park Service (Queen		65-	1967	Date	Mar. 15	Oct. 25		1972	Jan. 28	Jun. 15	
COUNTY	/8E-3C1 S 340149N1160800.1		Sheep Pass.	1961, 1965-	9	Water level	95.74	93.25	•	.1	92.99		
CALIFORNIA	State number 2S/8E-3C1 S Well-code number 340149N	Description of well:		Records available	1966	Date	Mar. 1	0ct. 26		1971	Apr. 1		•
									1.4				

er	<u>2S</u>	/8	E_	3C1_	<u>S_</u>	-	 	 	 _	 ,==
	1977	Apr. 20 93.00	Oct. 6 92.39							
	9	95.20	94.73							
			Nov. 4							



COUNTY Riverside AREA OR BASIN COPPER Mountain Hydro Subunit (S-8.BO)	State number         2S/8E_7K1 S         Depth of well         290         ft.         Altitude of land-surface datum         4,100         feet above mean sea level           Well-code number         340042N1161031.1         (88 m)         (1,250 m)	
SALIFORNIA COU	State number 2S/8F_7K1 S Well-code number 340042N1	

Well-code number	Well-code number 340042N1161031.1	(88 m)	(1,250  m)	ט ט ט
Description of well:	Description of well: National Park Service (Sto	skes No. 2). In narrow va	f Hidden Valley at west side of	
	Lost Horse Valley.	Lost Horse Valley. Drilled unused well in residuum, diameter 8 in (20 cm).	r 8 in (20 cm).	
Records available	1961-	(61.73 m) (69.47 m) (69.47 m) Highest water level 202.52 ft. Sep. 10 , 19 62 Lowest 227.92 ft. Oct. 6 , 1977	(69.47 m) (62 Lowest 227.92 ft. Oct. 6	. 1977

0,	Water level	217.84	218.59
1970	Date	Apr. 8	Oct. 29
69	Water level	216,65	216.80
1969	Date	Apr. 22	Oct. 24
8	Water level	215.81	216.15
1968	Date	Apr. 4	Oct, 29
1967	Water level	214.93	215.46
19	Date	Mar. 15	Oct. 25
99	Water level	213.69	214.50
1966	Date	Mar. 1	Oct. 26

St	ate	nu	nber	_2	S/	'8E	-7K1	S	 <del></del>	 		 
52	224.66	225.56									W	
1975	Apr. 7	Nov. 13										
	225.18	224.09										
1974	Feb. 26	Oct. 18										
23	221.75	222.54										
1973	Mar. 17	Sep. 25										
72	.220.31	220.80		1977	227.41	227.92						
1972	Jan. 27	Jun. 15		19	Apr. 20	Oct. 6						
7.1	219.06			76	226.00	226.86						
1971	Apr. 1			1976	Mar. 25	Nov. 4						



### GROUND-WATER LEVELS IN OBSERVATION WELLS

CALIFORNIA	COUNTY	COUNTY Riverside		1	AREA OR BASI	N Copp	AREA OR BASIN Copper Mountain Hydro Subunit (X-8.BO)	ro Subunit	(X-8.BO)
State number 25/8E-21G1 S	3E-21G1 S	084001	Depth of well 72.3 ft.	72.3 ft.	# (F	Altitude	of land-surface datum	4,400	Altitude of land-surface datum 4,400 feet above mean sea level
Well-code number 3339U3110U049U1	223202110	706400		1.77	ÇIII. Ç			(1,041 m)	·
Description of well:	National	Description of well: National Park Service (Lost	(Lost Horse N	(0.1)	, East	ide of	Horse No. 1). East side of Lost Horse Valley near Ryan Campground.	ey near Ry	an Campground.
	Dug pul	Dug public supply well in	11 in residuu	m, dia	residuum, diameter 72 in (183 cm)	in (18	3 cm).		

Records availabl	Records available 1958, 1961, 1974-	, 1974-	Highest water level, All water levels are	(11.80 evel 38.71 s are referenced to	m) ft. land-st	10 6 , 19 58 ace datum	May 6 , 19 58 Lowest 64.00 ft. Nov. 13 , 19 75 arface datum	(19.51 m) 64.00 R.	Nov. 13., 19.
15	1958	19	1961	19	1974	1975	.5	19	1976
Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level
May 6	38.71	Nov. 29	40.23	Oct. 18	63,96	Apr. 8	63,48	Mar. 25	63.79

63.58

S

Nov.

64.00

Nov.

St	ate	nu	mber	_ 2	S/	8E	-2	16	1	<u>S_</u>	 <del></del>	_	 <del></del>	·	-
77	63.51	63.44													
1977	Apr. 20	Oct. 6													



### GROUND-WATER LEVELS IN OBSERVATION WELLS

E-21G2 S
Horse No residuum ater level levels are ref
water level
Anr
Oct
Mar
Sep
+



1		اء			Str	ite number	_2S/1	12E - 3	6F1	5		 
(00)	1,547 feet above mean sea level (411 m) 1 mi (1.6 km) east of .	(125.0 m) 410.2 ft. Mar. 18 , 1965	Date Water level Anr. 8 403, 47	29 (n	1975	Measuréments discontinued						
Pinto Hydro Subunit (X-17.CO)	-	Lowest	1969 Water level 402, 51	(u)	1974	400.67						
nto Hydro S	0 1	r. 14, 19 63 face datum	19 Date Anr. 23	1 1	19	Feb 25						
area or basin Pii	444 fr. Attitude (135 m) ell, Gold Rose well).  'Drilled unused well	(122.03 m) 400.36 m. Mar. 1. sed to land-surface	Water level	(u)	3	400.39						
AREA	rell 444 (135 m) mes well, Orill	(122.) Highest water level 400.3 All water levels are referenced to	1968 Date		197.	Apr. 26 Sep. 24						
	il ≰ ⊢	Highest water le	Water level	400.37	72	403.06						
Riverside	718N1154034.1 tional Park Service (Dale Ho		1967 Date w		1972	Jan. 27 Jun. 15						
COUNTY R		1961-1974	Water level	400.51		400.93						
CALIFORNIA	State number 25/ Well-code number Description of well:	Records available	1966 Date	2	1971	Mar. 31						



	vel			77	, (~	·	4	·	St	ate	numl	per	-	<u>S/1</u>	5E	1 <u>J1</u>	S	,	 	· · · · ·	
	feet above mean sea level	pany's	•	Oct. 5 19	1070	Water level	c164.86	c166.17	1975	c167.88	c168.00										
(00.7	1,080.6 feet (329.4 m)	r Steel Comy		(51.64 m) 169.43 R.		Date	Mav 2	Oct. 28		Apr. 7	Nov. 12										
ubunit (X-1		near Kaise	(41 cm).	Lowest	960	Water level	(n)	165.06	1974	c167,72	c167.48										
Pinto Hydro Subunit (X-17.CO)	Altitude of land-surface datum_	No. 2). At east end of Pinto Basin near Kaiser Steel Company's	ed well in alluvium, diameter 16 in (41 cm).	Dec. 4, 19 54 rface datum	C	Date	Apr. 23	Oct. 23	19	Feb. 25	Oct, 17										
AREA OR BASIN PJ	ft. Alti	east end of	lluvium, dia	ft. land-su	88	Water level	(3)	(n)	73	c166,31	c167.72										
ARE	well 575 (175 m)	o. 2). At	d well in a	Highest water level 3150 All water levels are referenced to	1968	Date	Apr. 8	Nov. 7	197.	Mar, 17	Sep. 24										
	Depth of w	(Kaiser	Dril1	Highest water level All water levels are	5.7	Water level	c163.38	c163.78	72	c165.04	c165.37		7.7	c169.00 c169.43							
Riverside	52433.1	National Park Service	Eagle Mountain wells.		1967	Date	Mar. 17	0ct. 26	1972	Jan. 27	Jun. 15		1977	Apr. 19 Oct. 5							
COUNTY	S/15E-4J1 S 355612N1152433.		Eagle	1954-	56	Water level	c161.95	c162.94	7.1	c166,54			1976	c168.25							
CALLFORNIA	State number 3S, Well-code number	Description of well:		Records available_	1966	Date	Mar. 2	Oct. 27	1971	Mar. 31			19	Mar. 25 Nov. 4							



	vel		2	.,-	<b>,</b>		γ	ī	S	tate	nı	umber	==	<u>4S</u>	/1	LE-2	270	1	S	<del></del>	r=-	,		
	feet above mean sea level		Jun. 15 , 1972	7.0	Water level	188.87	189.40		7.5	191.15	186.26													
(0)	17 .	(30 cm).	(58.49 m)	1970	Date	Apr. 8	Oct. 28		197	Apr. 8	-	1										·		
Subunit (X-17.CO)	3, (5.6 km) n	eter 12 in	(5 Lowest 19	σ.	Water level	191.48	187,26		4	186.16	188.49													
Pinto Hydro Su	Allitude of land-surface datum, ee Wash 3.5 mi (5.6 ]	alluvium, diameter 12 in (50 cm) $$	Mar. 12 19 59 Irface datum	1969	Date	Apr. 25	Oct. 25		197	Feb. 25	0ct. 17													
AREA OR BASIN Pil	Depth of well $\frac{402}{(123 \text{ m})}$ ft. Altitude of land-surface datum $\frac{2,957}{(901 \text{ m})}$ (Cottonwood well). In Smoketree Wash 3.5 mi (5.6 km) north of	well in al	0 m) et. land-su	000	Water level	183.04	182,22		3	188.62	187,79													
ARE	well 402 (123 m) ood well). I	public supply well in	refere	1968	Date	Apr. 5	Nov. 7		197	Mar. 15	Sep. 24					-								
	Depth of w	Drilled	Highest water level All water levels are	7	Water level	180.59	181,84		2	188.02	191,89		1977	189.00	186.97									
Riverside	E-2701 S 534712N1154856.1 National Park Service	Cottonwood Spring.	1963-	.961	==	Mar. 17	Oct. 26		1972	Jan. 27	Jun. 15		15	Apr. 19	0ct. 5									
COUNTY	3"	Cotton	1958-61,	9	Water level	179.44	179.49			188.87			2	185.90	187.19									
CALLFORNIA	State number 4S/Well-code number Description of well:		Records available	1966	Date	Mar. 3	Oct. 28		1971	Mar. 31			1976	Mar. 25	Nov. 4									



1	vel			4					State	อุกบ	mbe	τ	1N	<u> /9</u>	<u>- 3</u>	3F4	l S	 -			 =
(X-9.AO)	feet above mean sea level	Past office on	.4.	Jan. 17 , 19 74		Water level															
Subunit (X-			Augered 1-16-74.	(2.8 m) 9.1 ft.		Date															
Palms Hydro Su	ace datum 1,981 (604 m)	trance to Inn.	sumb.	(2 Lowest 9	77	Water level	8.53	4													
Twentynine P	Altitude of land-surface datum	ft (241 m) inside entrance	ge of oasis	Oct. 6, 1977	111	Date	Apr. 20														
AREA OR BASIN T	ft. Alti	92 ft (241 m	on south ed	m) ft.  land-su		Water level	8 59	•													
AR	11 42 (13 m)	ximately 79	th of road	oforo	19	Date	Mar. 26														
ino	Depth of well	At Twentynine Palms Inn. Approximately 792	dirt road and 20 ft (6 m) north of road on south edge of oasis	Highest water level_	1975	Water level	8.75														
San Bernardino	160255.1	ynine Palms	road and 20	1	19	Date	Apr. 8														
COUNTY	N/9E-33F4 S r 340743N1160255.1		dirt 1	1974-	1974	Water level	9,1	8.82													1
CALIFORNIA	State number 1N/9E-33F4 S Well-code number 340743N1	Description of well:		Records available	19	Date	Jan. 17														-



road

	se i	ros		4					s	tato	num	ber_	 <u>IN/</u>	'9E	<u>-3</u>	3F5	S	,	 		 
.A0)	feet above mean sea level	Past office on dirt roa		Sep. 27 . 1974		Water level															
bunit (X-9	l (iii		4.	(2.83 m) 9.28 · R.		Date															
Palms Hydro Subunit (X-9.A0)		At Twentynine Palms Inn. Approximately 792 ft (241 m) inside entrance to Inn.	Augered 1-16-74.	Lowest	1977	10	8.76														
	Altitude of land-surface datum	) inside en		Apr. 20, 19 77 rface datum		Date	Apr. 20														
AREA OR BASIN TWentynine	ft. Alti	32 ft (241 m	ad on south edge of oasis sump.	m) ft. land-su	$\Pi_{\infty}$	Water level	8.89														
. ARE	22 . (7 m)	ximatelý 79	on south	Highest water level 8.76 All water levels are referenced to 18	1976	3 0	Mar. 26														
.01	Depth of well	Inn. Appro	orth of road	Highest water level, All water levels are	75	Water level	9.06	00.0													
San Bernardino	0255.2	ynine Palms	and 20 ft (6 m) north of ro		1975	Date	Apr. 8														
COUNTY S	1/9E-33F5 S 340743N1160255.2		and 20	1974-	7.4	Water level	9.08	9.28													
CALIFORNIA	State number IN.	Description of well:		Records available	1974	Date	Jan. 17		22												



I	vel		74	١.			<del></del>	,			State	nu	mbe	۲	11	4\5	θE -	33	<u> </u>	<u>S</u>				 	
(X-9.AO)	feet above mean sea level	) north	Sep. 27 1974			Water level																-			
Subunit (X-9	.961.91 feet 597.99 m)	m) west of ft (0.6 m)	(11.74 m)			Date									*										
Palms Hydro S		7 1,700 ft (518 m) west of approximately 2 ft (0.6 m) north	Lowest 38			Water level																			
Twentynine Pa	Altitude of land-surface datum	Approximately 1,700 ft (518 m) west of de of oasis, approximately 2 ft (0.6 m)	. 13 . 19 75	ace		Date																			
area or basin Tw		Si	m) ft. Nov.	land		Water level	(E)	(E)																	
AREA	1 48 ft. (15 m)	ent headquarters. ed path on north -73.	(9.54	refe	1976	Date	. 2	Nov. 5																	
01	Depth of well	along paved pared 12-5-73.	Highest water level	All water levels are	2	Water level	32.09	31,29																	
San Bernardino	0230.1	At Joshua Tree National Monum Park headquarters along pay of this path. Augered 12-5	1976		1975	Date	Apr. 8	Nov. 13		-															
COUNTY	/9E-33G1 S 340742N1160230	A	1974-1976			Water level	32.8	32.25	32.35	38.53															
CALIFORNIA	State number 1N/ Well-code number	Description of well:	Records available		1974	Date	Jan. 15	Mar. 20	Apr. 30	Sep. 27															



	le l		77		_						Sta	ste n	umbe	·r_	11	1\C	<u>)E-</u>	-33	III	_S_	=,=	 	,	,	 _	
.AO)	feet above mean sea level	fice, point.	0ct. 6 ,1			Water level																				
Subunit (X-9.AO)	1.960.75 feet (597.64 m)	west of of bservation	(16.14 m) 52.96 c			Date																				
		Approximately 650 ft (198 m) west of office, of large cottonwood tree at observation point	30		7.7	Water level	52,83	52.96																		
Twentynine Palms Hydro	Altitude of land-surface datum_	ximately 650 rge cottonwo	Mar. 2019 74	-surface datum	1977	Date	7	Oct. 6																		
AREA OR BASIN T	ft.			land	1976	Water level	52.63	52.75																		
A	ell 77 (23 m)	t headquar 30 ft (9 m)	(15.	rei		Date	2	Nov. 5																		
ino	Depth of well	At Joshua Tree National Monument headquarters. 78 ft (24 m) north of BM1 and 30 ft (9 m) west Augered 1-15-74.	forest water	All water level	7.5	Water level	52.33	52.52																		
San Bernardino	60220.1	a Tree Natic 24 m) north 1-15-74.			1975	Date	- 1	Nov. 13																		
COUNTY	1N/9E-33H1 S er 340741N1160220				7.4	Water level	52.15	52.14	52.19	54.45							7									
CALLFORNIA	State number 1N/ Well-code number	Description of well:	Agenda Agenta Palable		1974	Date	- 1	- 1		2ep. 7/																
										24																



	vel		7	.		,			~	St	ate	nur	nbe	r	ا_	N/	9E	-3	311	2_5					
. AO)	1,960.75 feet above mean sea level (597.64 m)	fice, n point.'.	Oct. 67	. 19		Water level																			
Hydro Subunit (X-9.A0)	60.75 feet 7.64 m)	m) west of office, at observation point				Date															·				
Palms Hydro Su		(198 tree		Lowest	7	Water level	51.59																		
Twentynine Pa	Altitude of land-surface datum_	Monument headquarters. Approximately 650 ft BMl and 50 ft (9 m) west of large cottonwood	20	datur	1977	0	Apr. 20	1																	
AREA OR BASIN TV	ft. Alt	ers. Approx ) west of la	55 m) # Mar.	land-s	76	Water level	51.49																		
ARI	well 55.6 (16.9 m)	it headquart   30 ft (9 m	(15.55 m)	9 1	1976	103	Mar. 26																		
ino	Depth of we	onal Monumen ı of BM1 and	force to the	All water levels	75	Water level	51.10																		
San Bernardino	60220.2	At Joshua Tree National Monument headquarters. 78 ft (24 m) north of BM1 and 50 ft (9 m) were Augered 1-15-74.			1975	c)	Apr. 8	1																	
COUNTY	1/9E-33H2 S 340741N1160220		1974-		7.4	Water level	51.01	51.14									•								
CALIFORNIA	State number IN/ Well-code number	Description of well:		recolos availanie	1974	0	Mar. 20	1																	



	vel		77			<b>,</b> .,					State	nu	mb	er_	_1	N/	'9E	_ 3	3.J	2 :	5			 	
AO)	feet above mean sea level		Oct. 6 19			Water level																			
Subunit (X-9,A0)	1,973.27 feet a (601.45 m)	m) west of	(5.20 m) 17.05 m			Date																			
Palms Hydro Sul		(152 oasis	owest	1	7.7	Water level	16.31	17.05																	
Twentynine Pa.	Aititude of land-surface datum	Iquarters. Approximately 500 ft south of southern paved path at J4. Augered 12-5-73.	20 74	-surface datum	197	Date	7	0ct. 6																	
AREA OR BASIN TW		of southern Augered 12-5	m) Mar.	land	76	Water level	16.01	16.82																	
ARE	well 36.2 fr (11.0 m)	Monument headquarters. 75 ft (23 m) south of swells J5 and J4. Auges		All water levels are referenced to	1976	Date	2	Nov. 5																	
ou	Depth of we		Highest water level	All water levels	75	Water level	15.64	10.5/																	
San Bernardino	0217.1	At Joshua Tree National maintenance building, 63 ft (19 m) south of			1975	a te		NOV. 13																	
COUNTY S	IN/9E-33J2 S se 340738N1160217.1	At	1974-		Į.	Water level	15.94	15.04	15.70	10.17															
CALIFORNIA	State number IN/ Well-code number	Description of well:	Records available_		1974	2.1	1	- 1	Son 27	och. 71															



	le!		7.7	-1							Stat	e n	umt	or,	 IN/	′9E	-3	<u>3J</u>	3	S		 		
, AO)	feet above mean sea level	oasis.	400			Water level																		
Subunit (X-9.AO)	1,972.02 feet (601.07 m)		(m	ë ë		Date																		
Palms Hydro Sul		Approximately 500 ft (152 m) west of m) south of southern paved path around		Lowest	1977	Water level	16.35	17.43								•								
Twentynine Pa	Altitude of land-surface datum	imately 500 h of southe	o	face datum	1.9	Date	Apr. 20	Oct. 6																
AREA OR BASIN TW		ers. Approx t (3 m) sout	E (	to land-surface	9	Water level	15.98	17.12																
ARE	well 55 ft. (11 m)	Monument headquarters. approximately 10 ft (3	(4.75	refe	1976	Date	2	Nov. 5																
no	Depth of w			All water levels are	7.5	Water level	15.59	16.91																
San Bernardino	60217.1	: Joshua Tree National maintenance building, Augered 12-5-73.			1975	Date		Nov. 13																
COUNTY	N/9E-33J3 S 340739N1160217	At			74	Water level	16.03	15.63	15.70	16.72												2		
CALIFORNIA	State number 1N, Well-code number	Description of well:		Records available	1974	Date		Mar. 20	Apr. 30	Sep. 27														



	vel		77					-		<b></b>	State	กน	m be	r_	]	NΛ	9E-	-3	3.J.	1 5	3	 	 		 
A0)	feet above mean sea level	sis.	Oct. 6 ,, 77			Water level																			
Hydro Subunit (X-9.AO)	1,972.02 feet (601.07 m)	m) west of path around oasis.	(5.33 m) 17.48 cm	. , ,		Date																			
Palms Hydro Su	1 1	ft (152 m) rn paved pat	9		7	Water level	16.31	17.48																	
Twentynine Pa	Altitude of land-surface datum	Monument headquarters. Approximately 500 ft (152 approximately 10 ft (3 m) south of southern paved	. 8	1 11	1977	Date	2	Oct. 6																	
AREA OR BASIN TW	li.	rs. Approx (3 m) sout	m) Apr.	1and	76	Water level	16.08	17.29																	
ARE	well 26.5 (8.1 m)	: headquarte nately 10 ft	(4,68	re	1976	e te	Mar. 26	Nov. 5																	
no	Depth of we		Hichest water level	All water levels	7.5	Water level	15.36	17.08																	
San Bernardino	0217.2	At Joshua Tree National maintenance building, Augered 12-5-75.			1975	Date		Nov. 13																	
COUNTY S	N/9E-33J4 S 340739N1160217	At	1974-			Water level	16.24	15.86	15.84	16.86															
CALIFORNIA	State number IN, Well-code number	Description of well:	Records available		1974	Date	- 1	Mar. 20	- i	Sep. 27															



	le l		48/				Stat	e nu	ımbe	r	11	1/9F	_3	3.15	S	 	 	 	 
.40)	. 48 (ect above mean sea level 55 m)	fice, IN/9E-33J1.	Sep. 27, 1974 Nov. 5 1976 Oct. 6, 1977		Water level														
Subunit (X-9.40)	,960.48 (ee: 597.55 m)	m) west of office, spring well IN/9E-33J1			Date														
Palms Hydro Su		ft (198 m) of oasis sp	Lowest (£)	7.7	9	(£)													
Twentynine Pa	Altitude of land-surface datum	imately 650 (1 m) east	. 8 19 75 face datum	197	40	Oct. 6													
AREA OR BASIN TW	ft.	headquarters. Approximately 650 and approximately 4 ft (1 m) east auger 4-29-74.	id m)  ft. Apr. 8  land-surface	76	Water level	3.37 (f)													
ARE	8.6 (2.6 m)	theadquarte and approxi auger 4-29	(1.54 Highest water level 5.05 All water levels are referenced to	1976	ate	Nov. 5													
no	Depth of well	: Joshua Tree National Monument headquarters. 11 ft (3 m) northeast of BM1, and approximat Hand augered with 4-in (10-cm) auger 4-29-74	Highest water levei. All water levels are	5	Water level	(n)													
San Bernardino	50220.3	Tree Natio		197	Date	Nov. 13													
COUNTY	1N/9E-33J5 S	1: At Joshua 11 ft ( Hand au	1974-	7.4	Water level	(f)													
CALIFORNIA	State number 1N	Description of well: At Joshua Tree National Monument headquarters.  11 ft (3 m) northeast of BM1, and approximat Hand augered with 4-in (10-cm) auger 4-29-74	Records available_	1974	Date 70	Sep. 27													



	vel		3		<b></b>			_		State	nu	m be	er <sub>sm</sub>	_1
AO)	Altitude of land-surface datum 1,970.58 feet above mean sea level (600,63 m)	orthwest south of	c. 4 . 1973	1977	Water level	20.77	23.73							•
bunit (X-9.	1,970.58 feet a (600.63 m)	) west of n y wash just 73.	(8.64 m) 28.35 ft. Dec. 4	19	Date	Apr. 20	0ct. 6							
ms Hydro Su	ce datum 1,9	Oft (518 m north of dr gered 12-4-	(8. Lowest 28.	. 9.	Water level	20.63	22.66							
entynine Pal	ide of land-surfa	mately 1,70 ft (49 m) apart. Au	ft. Apr. 8, 1975 Lowest 28.55 land-surface datum	1976	Date	Mar. 26	Nov. 5							
AREA OR BASIN Twentynine Palms Hydro Subunit (X-9.A0)		t headquarters. Approximately 1,700 ft (518 m) west of northwest is, and approximately 160 ft (49 m) north of dry wash just south of test holes 50 ft (15 m) apart. Augered 12-4-73.		-	Water level	20.38	22,49							
AREA	1 29.4 ft. (9.0 m)	headquarte, , and approtest	(6.21 m) level 20.38	1975	Date	Apr. 8	Vov. 13							
. 0	Depth of well 29.4 (9.0)	al Monument ce building t of three	Highest water le All water levels		Water level	21,37	20.63	20.44	23.20					
San Bernardino	1230.1	At Joshua Tree National Monument headquarters. Approximately 1,700 ft (518 m) west of northwest corner of maintenance building, and approximately 160 ft (49 m) north of dry wash just south o oasis. Northernmost of three test holes 50 ft (15 m) apart. Augered 12-4-73.		1974	Date	Jan, 15	Mar. 20	Apr. 30	Sep. 27					
COUNTY SE	9E-33K1 S 340740N1160230.1		1973-		Water level	28.35								
CALIFORNIA	State number 1N/9E-33K1 S Well-code number 340740N1	Description of well:	Records available	1973	Date	Dec. 4								

nu	mb	er,	_	<u>IN</u>	<u> </u>	]	3.3.1	(1	S	 -	 	 	



### GROUND-WATER LEVELS IN OBSERVATION WELLS

San Bernardino

COUNTY

CALIFORNIA

AREA OR EASIN TWENTYNINE Palms Hydro Subunit (X-9.A0)

State number   18/9E-38X2   State number   State n											
At Joshua Tree National Konument headquarters. Approximately 1,700 ft (518 m) west of northwest corner of maintenance building, approximately 110 ft (44 m) north of dry wash, south of oasis; middle of three tests holes 50 ft (15 m) proximately 110 ft (44 m) north of dry wash, south of oasis; middle of three tests holes 50 ft (15 m) may be a series of three tests are reference to 1 mid-Surface datum.    1973		9E-33K2 S 340739N116	1 1 1		37		tude of land-surf			bove mean sea le	ivel
1973-   Highest water loval   26.28 m)   Apr. 20 19.77   Lowest   51.52   ft.   Dec. 4     All water levels are referenced to   land-surface datum   Losse   1974     Water level   Date   S1.55   Wat. 26   21.95   Apr. 20   20.60     Apr. 30   22.41   Water level   Sep. 27   24.07   Water level   Sep. 27   24.07   Water level   Date	cription of well:	At Joshu corner middle	r of main	ational Monume tenance buildi e test holes E	ent headquart ng, approxim 10 ft (15 m)	به ۲۰	imately 1,7 (34 m) nor red 12-4-73	ft of		orthwest of oasis;	
1975   1974   1977   1977   1975   1977   1975   1977   1975   1977   1977   1977   1977   1977   1977   1977   1977   1977   1978   1977   1978   1977   1978   1977   1978   1977   1978   1977   1978	ords available	1973-		Righest wate	(6.28 r level 20.60	(a)	r. 20, 19 77	owest	ı i	1	73
1975   1976   1977   1978   1976   1977   1978   1977   1978	1			All water lev	els are referenced		משרח				10
## Water level   Date	1973			1974		75	1.0	)76	10	377	<sub>Y</sub>
4 \$1.52 Jan. 15 22.4 Apr. 8 21.55 Mar. 26 21.95 Apr. 20  Jan. 17 22.45 Jul. 24 22.99 Nov. 5 25.84 Oct. 6  Mar. 20 22.41 Nov. 15 21.75 Apr. 20  Sep. 27 24.07 Apr. 30	9	Water level	0,	+	Date	Water level	Date	Water level	Date	Water level	
17 22.45 Jul. 24 22.99 Nov. 5 23.84 Oct. 6 20 22.75 Nov. 13 21.75 Cot. 6 20 22.74 Cot. 6 21.75 Cot. 6 22.41 Cot. 6 22.61 Cot. 6 22.62 C			- 1	10		21,55		21.95		20.60	
20 22.73 Nov. 15 21. 30 22.41			- 1		- 1	22.99		23.84		24.45	
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AO)	1,972.09 feet above mean sea level (601.09 m)	northwest of oasis;	Oct. 6 197		7	Water level	21.87	24.46																	
ounit (X-9.	72.09 feet a	(518 m) west of northwest dry wash, south of oasis;	(7.46 m) 24.46 m		197	Date	Apr. 20	Oct. 6																	
Palms Hydro Subunit (X-9.A0)		14 0 14	Lowest		9	Water level	21.98	(E)																	
Twentynine Pal	Altitude of land-surface datum	Approximately 1,700 110 ft (34 m) north Augered 12-4-75.	Dec. 4, 19, 73		1976	Date	Mar. 26	Nov. 5																	
AREA OR BASIN TW	ft. Alti	AE.	ا.	to land-surface	75	Water level	21.53	21.45																	
ARE	ell 25 (8 m)	nent headquarters. ling, approximately 50 ft (15 m) apart	(6.41 m) evel 21.02	All water levels are referenced to	1975	Date	Apr. 8																		
ou:	Depth of well	nal Monumen nce buildin st holes 50	ابده	All water level:	4	Water level	22.4	22.41	21.67	21.61	24.18														
San Bernardino	50230.2	At Joshua Tree National Monum corner of maintenance build middle of three test holes			1974	Date	- 1	Jan. 17	- 1	Apr. 30	Sep. 27														
COUNTY	1/9E-53K3 S 340739N1160230		1973-		3	Water level	21:02																		
CALLFORNIA	State number IN. Well-code number	Description of well:	Records available		1973	Date	Dec. 4																		
O	II W ≸	bel .	oc.							3	2				 								- matte		



county San
9E-33K4 S Depth of well 340739N1160230.3
At Joshua Tree National Monument headquarters. Approximately 1,700 ft (518 m) west of northwest corner of maintenance building, approximately 60 ft (18 m) north of dry wash, south of oasis. Southernmost of three test holes 50 ft (15 m) apart. Augered 12/4/75.
1974- Highest water level 22.50
1975
Water level Date Water level
00 !
Nov. 15 24.49



		מוודה דמוודה מדווה	01170	ARE	AREA OR BASIN 11	Inentynine Palms Hydro	ne ornau smr	Subunit (A-9.AU)	AU	
State number 1N Well-code number	1N/9E-33K5 S sr 340739N1160230.4	160230.4	Depth of well	27.6 (8.41 m		Altitude of land-surface datum_	[]	1,975,15 feet a (601,41 m)	feet above mean sea level	vel
Description of well:	At	At Joshua Tree National corner of maintenance Southernmost of three		Monument headquarters. building, approximately test holes 50 ft (15 m)		Approximately 1,700 ft (60 ft (18 m) north of dr apart. Augered 12-4-75.	Approximately 1,700 ft (518 m) west of northwest 60 ft (18 m) north of dry wash, south of oasis. apart. Augered 12-4-75.	west of no.	oasis.	
Records available	1973-		Highest water li	(6.85 m) level 22.48		8 19 75		(7.75 m) 25.43 ft.	Oct. 6 19	77
	1973		All water levels	is are referenced to	to railu-surrace	דמרה ממרחוו			7.7	
Date	Water level	Date	Water level	Date	Water level	73.6	Water level	25.00	"Water love)	
Dec. 4	22.53	Jan. 15	23.47	Apr. 8	22.48	Mar. 26	22.76	Apr. 20	22.87	-,
		Mar. 20	22.74		24.48		24.63		25.43	
		- 1	24.99							
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